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Ecological Services
Sacramento Field Office
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In Reply Refer to:
1-1-94-F-5

March 30, 1994

Art Champ, Chief, Regulatory Section
Department of the Army
U.S. Army Engineer District, Sacramento
Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

Subject: Formal Endangered Species Consultation on the South Delta
Temporary Barrier in Old River at the San Joaquin River, Public
Notice 199300507, Department of Water Resources, Sacramento-San
Joaquin Delta, San Joaquin County, California.

This responds to your letter dated October 19, 1993, requesting formal
consultation pursuant to Section 7(a)(2) of the Endangered Species Act of
1973, as amended (Act), on the effects of installing a temporary barrier at
the head of Old River in the Sacramento-San Joaquin Delta, with closure on
April 22 of 1994 and 1995, and breaching on May 15 of each year, on the delta
smelt (*Hypomesus transpacificus*). The delta smelt is a federally listed
threatened species (Federal Register Volume 58, Number 42, March 5, 1993).

The Service's Region 1 Director has directed that the effects of all projects
on the Sacramento splittail (*Pogonichthys macrolepidotus*), a species that has
been proposed for Federal listing (Federal Register Volume 59, Number 4,
January 6, 1994), be addressed in any delta smelt section 7 consultations.
Therefore, we have included in this opinion, technical assistance
recommendations concerning the effects on this species.

This biological opinion also constitutes the conference report required by
50 CFR 402.10, on the proposed designation of delta smelt critical habitat
which was re-proposed in Federal Register Volume 59, Number 4, January 6,
1994.

BIOLOGICAL OPINION

It is our biological opinion that authorization of the proposed installation
of the temporary barrier in Old River at the San Joaquin River is not likely
to jeopardize the continued existence of the delta smelt or adversely modify
or destroy proposed critical habitat.

DESCRIPTION OF THE PROPOSED ACTION

The Department of Water Resources (DWR) has submitted an application for a

1-1-94-F-5 (MAD) (MAD) LTR / (MAD) FS

Department of the Army permit under authority of Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act to install a temporary barrier in Old River at the San Joaquin River during the 1994 and 1995 irrigation seasons. The proposed temporary barrier will have boat portage facilities to allow boat traffic to pass. The portage consists of a boat ramp with docks on each side of the barrier and a 4-wheel-drive vehicle with a universal trailer that can handle boats up to 25 feet long.

The Old River at San Joaquin River barrier has been installed by DWR in the fall season since 1968 and is permitted to be installed between September 1 and November 30, through 1997. The barrier was installed in the Spring of 1992 and as early as May in 1993. The Department of Water Resources now proposes to install the temporary rock barrier with no pipes or flap gates for two or more weeks between April 22 and May 15 of 1994 and 1995 provided monitoring indicates that delta smelt are not present in the tributary sloughs of the San Joaquin River up to April 1 of each year (monitoring must indicate less than an average of one adult delta smelt over the following mid-water trawl stations: 906, 913, 914, and 915; and captured in any one month's sampling period) (Randy Brown, pers. comm). DWR states that under spring installation the barrier will improve migration conditions in the Delta for the San Joaquin chinook salmon. The temporary barrier will improve migration by preventing fish from going down Old River toward the Federal and State export facilities and keep them in the main stem of the San Joaquin River during their downstream migration.

The barrier is designed to withstand flows up to 4,000 cfs. If flows are expected to be higher than 4,000 cfs, DWR is considering use of an acoustic barrier to aid in salmon migration. Because this technology is highly experimental, DWR does not feel that an acoustic barrier is a viable alternative to the physical barrier unless flows preclude the use of the physical barrier.

The Temporary Barriers Project is part of a proposed permanent plan between DWR, the U.S. Bureau of Reclamation and the South Delta Water Agency to provide the South Delta Water Agency with an adequate agricultural water supply for its users. The Temporary Barriers Project will test whether proposed permanent barriers will: 1) improve the availability of water for existing irrigators; 2) improve water levels; 3) improve San Joaquin River salmon migration; and 4) improve water quality and circulation patterns.

SPECIES ACCOUNT/ENVIRONMENTAL BASELINE

Species Account

Delta smelt: Please refer to the final rule to list the delta smelt as a threatened species (USFWS 1993), and the February 4, 1994, CVP-OCAP biological opinion for delta smelt (Case No. 1-1-93-F-2) and the draft Biological Assessment (DWR 1993), for additional information on the biology and ecology of this species. Studies are currently being done to elucidate aspects of delta smelt biology that are not fully understood.

Historically, the delta smelt is thought to have occurred from Suisun Bay upstream to the city of Sacramento on the Sacramento River and Mossdale on the San Joaquin River (Moyle *et al.* 1992). The delta smelt is an euryhaline species (tolerant of a wide salinity range) that spawns in fresh water and has been collected from estuarine waters up to 14 parts per thousand (ppt) salinity (Moyle *et al.* 1992). For a part of its annual life span, the distribution of juvenile smelt tends to be centered near the freshwater edge of the entrapment zone (EZ) (mixing zone at the saltwater-freshwater interface), where the salinity is approximately 2 ppt (Ganssle 1966, Moyle *et al.* 1992).

The delta smelt is adapted to living in the highly productive Sacramento-San Joaquin River Estuary (Estuary) where salinity varies spatially and temporally according to tidal cycles and the amount of freshwater inflow. Despite this tremendously variable environment, the historical Estuary probably offered relatively constant suitable habitat conditions to delta smelt, because they could move upstream or downstream with the EZ (Moyle, pers. comm., 1993). The final rule to list the delta smelt as a threatened species (USFWS 1993) describes in detail the factors that have contributed to this species' decline.

Shortly before spawning, adult delta smelt migrate upstream from the brackish-water habitat associated with the entrapment zone to disperse widely into river channels and tidally-influenced backwater sloughs (Moyle 1976, Radtke 1966, Wang 1991). Delta smelt spawn in shallow, fresh or slightly brackish water and most spawning occurs in tidally-influenced backwater sloughs and channel edgewater (Moyle 1976; Moyle *et al.* 1992; Wang 1986). Although delta smelt spawning behavior has not been observed in Delta channels (Moyle *et al.* 1992), the adhesive, demersal eggs are thought to attach to substrates such as cattails and tules, tree roots, and submerged rocks and branches (Moyle 1976, Wang 1991).

Spawning location appears to vary from year to year. In the Delta, spawning has occurred in the Sacramento River, Barker Slough, Lindsey Slough, Cache Slough, Georgiana Slough, Prospect Slough, Beaver Slough, Hog Slough, Sycamore Slough, in the San Joaquin River off Bradford Island including Fisherman's Cut, False River, and along the shore zone of Frank's Tract and Webb's Tract, and possibly other areas (Wang 1991; Dale Sweetnam, DFG, pers. comm.). Delta smelt also may spawn north of Suisun Bay in Montezuma and Suisun sloughs and their tributaries (Lesá Meng, Service, pers. comm.; Sweetnam, DFG, pers. comm.).

The spawning season varies from year to year and may occur from late winter (December) to early summer (July). Moyle (1976) collected gravid adults from December to April, although ripe delta smelt were most common in February and March. In 1989 and 1990, Wang (1991) estimated that spawning had taken place from mid-February to late June or early July, with the peak spawning period occurring in late April and early May.

Delta smelt eggs hatched in 9-14 days at temperatures from 13-16° C during laboratory observations in 1992 (Mager as cited in DFG 1993). After hatching, larvae and juveniles are transported downstream toward the entrapment zone

where they tend to be retained by the vertical circulation of fresh and salt waters (Stevens *et al.* 1990). The pelagic larvae and juveniles feed on zooplankton. When the entrainment zone is located in a broad geographic area with extensive shallow-water habitat within the euphotic zone (depths less than four meters), high densities of phytoplankton and zooplankton accumulate (Arthur and Ball 1978, 1979, 1980). However, since the introduction of the asian clam (*Potamocorbula amurensis*) in 1986, phytoplankton abundance has dropped dramatically. In general, estuaries are among the most productive ecosystems in the world (Goldman and Horne 1983). Estuarine environments produce an abundance of fish as a result of plentiful food and shallow, protective habitat for young.

When the 2 ppt isohaline is contained within Suisun Bay, young delta smelt are dispersed more widely throughout a large expanse of shallow-water and marsh habitat than when the 2 ppt isohaline is upstream in the lower reaches of the Sacramento-San Joaquin Rivers. Dispersion in areas downstream from Collinsville reduces the susceptibility of young smelt to entrainment at the State and Federal pumping plants. It also distributes them among the extensive, protective, and highly productive shoal regions of Suisun Bay. In contrast, when located upstream, the 2 ppt isohaline entrainment zone becomes confined in the deep river channels, that are smaller in total surface area, contain fewer shoal areas, and lack high zooplankton concentrations.

Technical Assistance

Sacramento splittail: The Sacramento splittail, (*Pogonichthys macrolepidotus*), is a large cyprinid that can reach greater than 12 inches in length (Moyle 1976). Adults are characterized by an elongated body, distinct nuchal hump, and a small blunt head with barbels usually present at the corners of the slightly subterminal mouth. This species can be distinguished from other minnows in the Central Valley of California by the enlarged dorsal lobe of the caudal fin. Splittail are a dull, silvery-gold on the sides and olive-grey dorsally. During the spawning season, the pectoral, pelvic and caudal fins are tinged with an orange-red color. Male develop small white nuptial tubercles on the head.

Splittail are endemic to California's Central Valley where they were once widely distributed (Moyle 1976). Historically, splittail were found as far north as Redding on the Sacramento River and as far south as the site of Friant Dam on the San Joaquin River (Rutter 1908). Rutter (1908) also found splittail as far upstream as the Oroville Dam site on the Feather River and Folsom Dam site on the American River. Anglers in Sacramento reported catches of 50 or more splittail per day prior to damming of these rivers (Caywood 1974).

In recent times, dams and diversions have increasingly prevented upstream access to large rivers and the species is restricted to a small portion of its former range (Moyle and Yoshiyama 1992). Splittail enter the lower reaches of the Feather (Jones and Stokes 1993) and American Rivers (Charles Hanson, State Water Contractors, *in litt.*, 1993) on occasion, but the species now largely is confined to the Delta, Suisun Bay, Suisun Marsh, and Napa Marsh.

Splittail are long lived, frequently reaching five to seven years of age. Females are highly fecund and each produces over 100,000 eggs. Populations fluctuate annually depending on spawning success. Spawning success is highly correlated with fresh water outflow and the availability of shallow-water habitat with submerged vegetation (Daniels and Moyle 1983). Splittail usually reach sexual maturity by the end of their second year. There is some variability in the reproductive period since older fish reproduce before younger individuals (Caywood 1974). Splittail migrate upstream to spawn, similar to delta and longfin smelt. The onset of spawning is associated with rising temperature and peaks from the months of March through May, although there are records of spawning from late January to early July (Wang 1986). Spawning occurs over flooded vegetation in tidal freshwater and euryhaline habitats of estuarine marshes and sloughs and slow-moving reaches of large rivers. Larvae remain in shallow, weedy areas close to spawning sites and move into deeper water as they mature (Wang 1986).

Splittail are benthic foragers that feed on opossum shrimp, although detrital material makes up a large percentage of their stomach contents (Daniels and Moyle 1983). Earthworms, clams, insect larvae, and other invertebrates are also found in the diet. Predators include striped bass and other piscivores. Splittail are sometimes used as bait for striped bass. Although this occurs it is not a common practice.

Splittail can tolerate salinities as high as 10-18 ppt (Moyle 1976, Moyle and Yoshiyama 1992). Splittail are found throughout the Delta, Suisun Bay and Suisun and Napa marshes. They migrate upstream from brackish areas to spawn in freshwater. Because they require flooded vegetation for spawning and rearing, splittail are frequently found in areas subject to flooding.

The 1983-1992 decline in splittail abundance is concurrent with hydrologic changes to the Sacramento-San Joaquin Estuary. These changes include increases in water diversions during the spawning period of January through July and dams that limit upstream migration. Diversions, entrainment due to CVP/SWP pumping, dams and reduced outflow, coupled with severe drought years, introduced aquatic species, and loss of wetlands and shallow-water habitat (DFG 1992) appear to have reduced the species' capacity to reverse its decline.

Environmental Baseline

The existing environmental baseline includes Central Valley Project (CVP) and State Water Project (SWP) operations modified by D-1485, the February 12, 1993, winter-run chinook salmon biological opinion, and the Service's February 4, 1994, delta smelt biological opinion. For the reasons described below, baseline conditions in the past have resulted in the long term population decline of the delta smelt. However, measures required in the Service's delta smelt biological opinion will likely reverse this decline.

The delta smelt is adapted to living in the highly productive Sacramento-San Joaquin River estuary where salinity varies spatially and temporally according to tidal cycles and the amount of freshwater inflow. Despite this tremendously variable environment, the historical Estuary probably offered

relatively consistent spring transport flows that moved delta smelt juveniles and larvae downstream to the EZ (Peter Moyle, University of California, pers. comm., 1993). Since the 1850's, however, the amount and extent of suitable habitat for the delta smelt has declined dramatically. The advent in 1853, of hydraulic mining in the Sacramento and San Joaquin Rivers, led to increased siltation and alteration of the circulation patterns of the estuary (Nichols et al. 1986, Monroe and Kelly 1992). The reclamation of Merritt Island for agricultural purposes, in the same year, marked the beginning of the present-day cumulative loss of 94 percent of the Estuary's tidal marshes (Nichols et al. 1986, Monroe and Kelly 1992).

In addition to this degradation and loss of estuarine habitat, the delta smelt has been increasingly subject to entrainment, upstream or reverse flows of waters in the Delta and San Joaquin River, and constriction of low salinity habitat to deep-water river channels of the interior Delta (Moyle et al. 1992). These adverse conditions are primarily a result of the steadily increasing proportion of water diverted from the Delta by the Federal and State water projects (Monroe and Kelly 1992). Water delivery through the CVP began in 1940. The SWP began delivering water in 1968. However, the proportion of freshwater being diverted has increased since 1983, and has remained at extremely high levels ever since (Moyle et al. 1992). The high proportion of fresh water exported has exacerbated the already harsh environmental conditions experienced by the delta smelt during the last six drought years. Fortunately, low salinity habitat was pushed downstream of Roe Island at the beginning of 1993 due to above normal outflows and implementation of the delta smelt biological opinion mitigation requirements. By late 1993, however, low salinity habitat moved back upstream as inflow decreased and water exports increased. Transport to the shallow reaches of Suisun Bay allows delta smelt to disperse in a wide geographic area, thus increasing their chances for survival to adulthood. The fall mid-water trawl index showed an increase in delta smelt abundance concurrent with the more favorable placement of low salinity habitat in early 1993.

Seven abundance indices used to record trends in the status of the delta smelt showed that this species suffered consistently low population levels in the last ten years (Stevens et al. 1990). These same indices also show a pronounced decline from historical levels of abundance. The summer tow-net abundance index is thought to be one of the more representative indices because data has been collected over a wide geographic area (from San Pablo Bay upstream through most of the Delta) for the longest period of time (since 1959). The summer tow net abundance index measures the abundance and distribution of juvenile delta smelt and provides data on the recruitment potential of the species.

The second longest running study (since 1967), the fall mid-water trawl, measures the abundance and distribution of adult delta smelt in a large geographic area (San Pablo Bay upstream to Rio Vista on the Sacramento River and Stockton on the San Joaquin River) (Stevens et al. 1990). The fall mid-water trawl provides an indication of delta smelt survivorship. Until recently, this index has declined irregularly over the past 20 years. The results of surveys currently done by the Interagency Ecological Study Program (IESP) corroborate the dramatic declines in delta smelt attributable to

baseline conditions.

There are over 1,800 screened and unscreened diversions within the delta most of which adversely impact delta smelt. Diversions in the northern and central Delta, where delta smelt abundance is highest, are likely the greatest source of entrainment. No fish screens can protect all delta smelt from being entrained or impinged. Larval delta smelt are particularly susceptible to entrainment even with the best screening. The current DFG criteria for screening salmon of 0.33 feet per second approach velocity and 3/32-inch opening for a profile bar screen or 5/32-inch opening for a perforated plate was based primarily on the needs of salmon. Ongoing studies may result in a new recommended approach velocity. The Service recommends a 0.2 feet per second approach velocity with a 3/32-inch opening at this time for delta smelt. This estimate is based on swimming tests done with shad (Service 1993), not a closely related species but which has one of the lowest velocity requirements that have been measured.

During the delta smelt critical rearing interval from February 1 to June 30, adequate outflows of sufficient magnitude and duration are beneficial to maintain the placement of the EZ. For delta smelt these flows provide transport away from the influence of the CVP/SWP pumps, but also provide the necessary habitat rearing areas within Suisun Bay and Marsh. To be free of the influence of the pumping plants, the EZ needs to be at or downstream of the confluence of the Sacramento-San Joaquin Rivers.

Critical Habitat

Critical habitat is defined in section 3 (5)(A) of the Act as (i) the specific areas within the geographical area occupied by the species on which are found those physical and biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species that are essential for the conversation of the species. The Service has proposed constituent elements (physical and biological elements) necessary to conserve the delta smelt at each of its life stages and a geographic area where those constituent elements may be found (USFWS 1994). Accordingly, critical habitat is proposed for the following geographic area: Areas of all water and all submerged lands below ordinary high water and the entire water column bounded by and contained in Suisun Bay (including the contiguous Grizzly and Honker Bays); the length of Goodyear, Suisun, Cutoff, First Mallard (Spring Branch), and Montezuma Sloughs; and the existing contiguous waters contained within the Delta. The proposed critical habitat is contained within Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties.

EFFECTS OF THE PROPOSED ACTION

Modeling studies conducted for the South Delta Water Management Program and the South Delta negotiations show improvements in water levels, water circulation and water quality in the south Delta channels. Although improvements in water levels and water quality may prove beneficial to the delta smelt by providing additional habitat and cleaner water in which to

live, it is the alteration in water circulation that may adversely affect the delta smelt. Modeling information taken from a report prepared by the Department of Water Resources (1993) shows a dramatic change in water circulation in many of the south Delta sloughs when the three temporary barriers (Middle River near Victoria Canal, Old River near Tracy, and Old River at San Joaquin River) are in place. These changes in flows are of major concern in the protection of the delta smelt because they are significant enough to potentially prevent the free floating larvae and juvenile delta smelt from reaching the eastern Suisun Bay in their downstream migration.

The proposed project would likely pull delta smelt larvae and juveniles from the central delta and towards the export facilities by changing the circulation of flows in the central delta. Modeling using 15,838 cfs Sacramento River inflow, 2,000 cfs San Joaquin River inflow, no barriers and a combined CVP/SWP pumping rate of 1,400 cfs shows flow patterns that yield relatively low cfs flows from the central Delta towards the Federal and State export facilities. However, under the same conditions plus installation of the three temporary barriers, DWR modeling (1993) shows an increase in flows down the San Joaquin River, around McDonald Tract and Bacon Island and toward Clifton Court Forebay. However, DWR has stated that the incidental take statement, required in the 1994 biological opinion for the operation of the CVP/SWP, will not be exceeded and stated that they will decrease pumping, increase flows, remove the barrier, or provide other measures to assure this.

The temporary barrier in Old River at the San Joaquin River will be designed to withstand flows up to 4,000 cfs. The February 4, 1994, biological opinion for the operation of the CVP/SWP requires a pulse flow of 5,200 cfs down the San Joaquin River for 30 days between April 1 to May 15 if monitoring indicates that adult delta smelt are present in the lower San Joaquin River or its tributary sloughs. Even though the design of the temporary barrier in Old River will not be able to withstand a pulse flow of this amount, the delta smelt must receive this necessary flow to transport them to suitable rearing habitat in the eastern Suisun Bay. Although Reclamation has determined 1994 to be a critical water year, and a pulse flow of only 2,400 cfs may be required down the San Joaquin if delta smelt are present as mentioned above, it is not yet known if future years will require the 5,200 cfs flow. However, DWR understands that, if necessary, the wet year flow will be provided even though if it may disrupt the barrier (Randy Brown, pers. comm.).

Critical Habitat

The Service has determined that placement of a temporary barrier in Old River at the San Joaquin River is not likely to destroy or adversely modify proposed critical habitat provided installation of the barrier does not, in any way, interfere with the requirements set in the 1994 biological opinion for the operation of the SVP/SWP.

Conclusion

The installation of the temporary barrier in Old River near the San Joaquin River causes a significant change in the hydrology in the southern and central Delta. This change in hydrology may prevent delta smelt larvae and juveniles

from reaching their rearing habitat in the eastern Suisun Bay because the flows towards the export facilities are increased thus increasing the likelihood of incidental take at these facilities. Because DWR has agreed to take necessary precautions to prevent the incidental take at the export facilities from being exceeded and is aware that the required wet year pulse flow will be provided despite the design of the barrier, installation of the temporary barrier in Old River near the San Joaquin River will not jeopardize the survival or recovery of the species in the wild (Randy Brown, pers. comm.). Critical habitat, as mentioned above, will not likely be destroyed or adversely modified.

TECHNICAL ASSISTANCE

Sacramento Splittail:

The proposed project effects mentioned above are similar to those described for the delta smelt.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, local, or private actions affecting listed species that are reasonably certain to occur in the area considered in this biological opinion. Future Federal actions not related to this proposed action are not considered in determining the cumulative effects, but are subject to separate consultation requirements pursuant to section 7 of the Act.

Cumulative effects on the delta smelt or its proposed critical habitat include any continuing or future diversions of water that may entrain adult or larval fish or that may decrease outflows incrementally, thus shifting upstream the position of the delta smelt's preferred habitat. Water diversions through intakes serving numerous small, private agricultural and duck clubs in the Delta, upstream of the Delta, and in Suisun Bay contribute to these cumulative effects. These diversions also include municipal and industrial uses, and provide cooling water for power plants. State or local levee maintenance and channel dredging activities also destroy or adversely modify proposed critical habitat by disturbing spawning or rearing habitat. Delta smelt adults seek shallow, tidally-influenced, freshwater (i.e., less than 2 ppt salinity) backwater sloughs and edgewaters for spawning. To assure egg hatching and larval viability, spawning areas also must provide suitable water quality (i.e., low concentrations of pollutants) and substrates for egg attachment (e.g., submerged tree roots and branches and emergent vegetation). Suitable water quality must be provided by addressing point sources of contaminants so that maturation is not impaired by pollutant concentrations. Levee maintenance and channel dredging disturbs spawning and rearing habitat, and re-suspends contaminants into these waters.

Cumulative effects also include point and non-point source chemical contaminant discharges. These contaminants include selenium and numerous pesticides and herbicides associated with discharges related to agricultural and urban activities. Implicated as potential sources of mortality in delta smelt, these contaminants may adversely affect smelt reproductive success and

survival rates.

Technical Assistance

Effects to Sacramento splittail resulting from the above cumulative effects are similar to those described for the delta smelt.

INCIDENTAL TAKE

Sections 4(d) and 9 of the Act, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Under the terms of §7(b)(4) and §7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement. The measures described below are non-discretionary and must be implemented by the agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in §7(o)(2) to apply. The Federal agency has a continuing duty to regulate the activity that is covered by this incidental take statement. If the agency fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of §7(o)(2) may lapse.

The U.S. Fish and Wildlife Service anticipates that delta smelt could be adversely affected as a result of the temporary barrier in Old River at the San Joaquin River as mentioned in the Effects of the Proposed Action. Adults and larvae may be present in this area during the spawning season. The incidental take is expected to occur in the form of increased incidental take at the CVP/SWP export facilities as a result of hydrologic changes. On implementation of the reasonable and prudent measures below, DWR is authorized to incidentally take delta smelt up to the limits provided in USFWS (1994) for 1994. For 1995, DWR must reinitiate consultation if a new incidental take limit is generated for the long-term biological opinion.

Reasonable and Prudent Measures

The Service determines that the following reasonable and prudent measures are necessary and appropriate to minimize the impact of incidental take of delta smelt. The measures below are non-discretionary, and must be undertaken to avoid possible adverse effects to delta smelt.

1. Avoid exceeding the incidental take limit at the CVP/SWP salvage facilities, set as part of the biological opinion on the operation

of the CVP/SWP.

2. Ensure that excessive levels of take do not occur as a result of this project due to inaccuracies in the hydrologic model.
3. Avoid interference with compliance of any action required in the February 4, 1994, biological opinion prepared for the operation of the CVP/SWP.

Terms and Conditions

To be exempt from the prohibitions of section 9 of the Act, the following terms and conditions, which implement the reasonable and prudent measure described above, must be complied with in entirety.

1. To minimize the likelihood of the incidental take limit, set as part of the February 4, 1994, biological opinion for the operation of the CVP/SWP from being exceeded, steps such as reduced pumping at the export facilities, barrier removal, increased flows down the San Joaquin River, or other measures deemed necessary and appropriate shall be immediately implemented by DWR and BOR before reaching the authorized take limit. Further, monitoring at the above mentioned mid-water trawl stations and the below mentioned gauging stations shall be conducted in order to provide "heads up" information on the presence of delta smelt so that the necessary modifications may be made in advance of exceeding the incidental take limit. Monitoring shall be conducted at least three times per week once the barrier is installed and shall continue bi-weekly upon removal of the barrier. Results of the monitoring shall be submitted to the Service by January 1 of each year.
2. To ensure that excessive levels of take do not occur due to inaccuracies in the hydrologic model, a study plan shall be submitted to the Service for approval as soon as possible but no later than by October 1, 1994, to verify the hydrologic model by examining the hydrologic changes caused from the installation of the barrier at the head of Old River. The study plan shall make use of drogues and particles (striped bass eggs) injected with florescent dye to study river currents and track the movement of the particles towards Suisun Bay. Upon approval of the Service, the study plan shall be immediately implemented. Furthermore, funding shall be made available to allow for the installation of permanent gauging stations with continuously recording velocity meters (S4 meters) in approximately eight tributaries and sloughs that are effected by the barrier, so that background information may be generated. This background information shall subsequently be used to further verify the modeling runs conducted by DWR and to determine the effects of installing a permanent barrier at this location as well as other locations in the southern delta. This

monitoring shall be conducted continuously, unless otherwise notified by the Service, and results summarized and provided to the Service by January 1 of each year.

3. To minimize the likelihood of interfering with compliance of any action required in the February 4, 1994, biological opinion for the CVP/SWP, installation of the temporary barrier shall not impede San Joaquin pulse flows from accomplishing their intended purposes.

Technical Assistance

Sacramento Splittail:

The above terms and conditions for delta smelt should also remove the adverse effects of barrier installation on Sacramento splittail.

Reporting Requirements

The Service shall require personnel to report immediately any information about take or suspected take of delta smelt. Applicants shall immediately notify the Service within 1 working day of any such information. Notification must include the date, time, and precise location of the incident/specimen, and any other pertinent information. The Service contact person is Matthew Vandenberg at 916-978-4866. Any killed specimens that have been taken shall be properly preserved in accordance with Natural History Museum of Los Angeles County policy of assessment (10% formalin in quart jar or freezing). Information concerning how the fish was taken, length of the interval between death and preservation, the water temperature and outflow/tide conditions, and any other relevant information shall be written on 100% rag content paper and included in the container with the specimen. This preserved specimen shall be delivered to the Service's Division of Law Enforcement at 2800 Cottage Way, Sacramento, California 95825-1846 (916-978-4861).

CONSERVATION RECOMMENDATIONS

Sections 2(c) and 7(a)(1) of the Act direct Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species and the ecosystems upon which they depend. Conservation recommendations are Service suggestions regarding discretionary agency activities to promote the recovery of listed species. Therefore, the Service recommends the following additional actions to promote the recovery of federally listed species and their habitats:

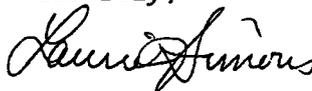
- (1) Conduct continuous studies on water quality at the gauging stations in the southern delta to provide baseline information on the effects of agricultural run off to species of concern.

CONCLUSION

This concludes formal consultation on the proposed installation of a temporary barrier in Old River at the San Joaquin River as described above. Re-initiation of formal consultation is required if (1) the amount or extent of incidental take is exceeded, as previously described, (2) the provisions and requirements under the INCIDENTAL TAKE section are not implemented, (3) new information reveals effects of the temporary barrier operations that may affect listed species or critical habitat in a manner that was not considered in this opinion, (4) a new species is listed or critical habitat is designated that may be affected by the action.

If you have any questions regarding this opinion, please contact Matthew D. Vandenberg at the Sacramento Field Office at 916-978-4866 for further discussion.

Sincerely,



for Dale Pierce
Acting Field Supervisor

cc: WR Div., SFO, USFWS, Sacramento, California
CDFG, Bay-Delta Office, (Attn: Dale Sweetnam)
USEPA, Region II (Attn: Bruce Herbold)
NFMS, Protected Species Management Div. (Attn: Gary Stern)

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Literature Cited

- Arthur, J.F., and M.D. Ball. 1978. Entrapment of suspended materials in the San Francisco Bay-Delta Estuary. U.S. Dept. Interior, Bureau of Reclamation, Sacramento, California.
- Arthur, J.F., and M.D. Ball. 1979. Factors influencing the entrapment of suspended material in the San Francisco Bay-Delta Estuary. Pages 143-174 in T.J. Conomos, editor. Pacific Division, Amer. Assoc. Advance. Sci., San Francisco, California.
- Arthur, J.F., and M.D. Ball. 1980. The significance of the entrapment zone location to the phytoplankton standing crop in the San Francisco Bay-Delta Estuary. U.S. Dept, Interior, Water and Power Resources Service.
- Caywood, M.L. 1974. Contributions to the life history of the splittail *Pogonichthys macrolepidotus* (Ayres). M.S. Thesis. California State University, Sacramento.
- Daniels, R.A. and P.B. Moyle 1983. Life history of the splittail (Cyprinidae: *Pogonichthys macrolepidotus*) in the Sacramento-San Joaquin estuary. Fish. Bull. 84:105-117.
- DFG, 1993. Report to the Fish and Game Commission: A status review of the delta smelt (*Hypomesus transpacificus*) in California. Candidate Species Status Report 93-DS. 98 pages plus appendices.
- DWR, 1993. Biological Assessment for South Delta Temporary Barriers Project for USWFS Section 7 Endangered Species Permit, Amendment 1. 33 pages.
- Ganssle, D. 1966. Fishes and decapods of San Pablo and Suisun Bays. Pages 64-94 in D. W. Kelly, editor. Ecological studies of the Sacramento-San Joaquin estuary, Part 1. Calif. Dept. Fish and Game, Fish Bulletin 133.
- Goldman, C.R., and A.J. Horne. 1983. Limnology. McGraw-Hill Book Company, New York, New York.
- Jones and Stokes Assoc., Inc. 1993. Sutter Bypass fisheries technical memorandum II: potential entrapment of juvenile chinook salmon in the proposed gravel mining pond. May 27, 1993. (JSA 91-272), Sacramento, California. Prepared for Teichert Aggregates, Sacramento, California. 31 pp. + Appendix.
- Monroe, M.W., and J. Kelly. 1992. State of the estuary: A report on conditions and problems in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. San Francisco Estuary Project, Oakland, California.
- Moyle, P.B. 1976. Inland Fishes of California. University of California Press, Berkeley, California. 405 pp.
- Moyle, P. B., B. Herbold, D. E. Stevens, and L. W. Miller 1992. Life history and status of delta smelt in the Sacramento-San Joaquin Estuary, California. Trans. Am. Fish. Soc. 121:67-77.

- Moyle, P.B. and R. M. Yoshiyama 1992. Fishes, aquatic diversity management areas, and endangered species: A plan to protect California's native aquatic biota. Draft report prepared for California Policy Seminar, University of California, Berkeley, California. July, 1992. 196 pp.
- Nichols, F.H., J.E. Cloern, S.N. Luoma, and D.H. Peterson. 1986. The modification of an estuary. *Science* 231:567-573.
- Radtke, L. D. 1966. Distribution of smelt, juvenile sturgeon, and starry flounder in the Sacramento-San Joaquin Delta. Pp. 115 - 119 in J. L. Turner and D. W. Kelley, eds.: Ecological studies of the Sacramento-San Joaquin estuary, Part 2. California Department of Fish and Game Fish Bulletin No. 136.
- Rutter, C. 1908. The fishes of the Sacramento-San Joaquin basin, with a study of their distribution and variation. U.S. Bur. Fish. Bull. 27:103-152.
- Stevens, D. E., S. W. Miller, and B. C. Bolster 1990. Report to the Fish and Game Commission: A status review of the delta smelt (*Hypomesus transpacificus*) in California. California Department of Fish and Game Candidate Species Status Report 90-2. 149 pages.
- USFWS 1994. Federal Register Volume 59, Number 4, January 6, 1994.
- USFWS 1994. Formal consultation on Central Valley Project Operations Criteria and Plan for 1994: Effects on delta smelt (1-1-94-F-2). 34 pages plus figures.
- USFWS 1993. Formal consultation on Central Valley Project Operations Criteria and Plan for 1993: Effects on delta smelt (1-1-94-F-32). 37 pages plus figures.
- USFWS 1993. Federal Register Volume 58, Number 42, March 5, 1993.
- Wang, J.C.S. 1986. Fishes of the Sacramento-San Joaquin estuary and adjacent waters, California: A guide to the early life histories. Interagency Ecological Study Program for the Sacramento-San Joaquin Estuary, Tech. Rept. 9.
- Wang, J.C.S. 1991. Early life stages and early life history of the delta smelt, *Hypomesus transpacificus*, in the Sacramento-San Joaquin estuary, with comparison to early life stages of the longfin smelt, *Spirinchus thaleichthys*. Interagency Ecological Studies Program for the Sacramento-San Joaquin Estuary. Tech. Rept. 28.

Personal Communications

Brown, Randy, Department of Water Resources, 2800 Cottage Way, Sacramento, CA 95825-1846

Moyle, P.B., University of California at Davis, Davis, CA 95

Meng, Lesa, U.S. Fish and Wildlife Service, 2800 Cottage Way, Room E-1803,
Sacramento, CA 95825-1846

Sweetnam, D., DFG, Bay-Delta and Special Water Projects Division, 4001 N.
Wilson Way, Stockton, CA 95205-2424.



**Ecological Services
Sacramento Field Office
2800 Cottage Way, Room E-1803
Sacramento, California 95825-1846**

	Init.	Date
Author	MV	3.9.94
SSS	MJS	3-9-94
SSS	STW	3.9.94
HEP/IFIM		
AFS-HC	LB	3/9
AFS-WR		
ADMIN		
Signature	AS	3/14/94
File #	1-1-94-I-403	

**In Reply Refer To:
1-1-94-I-403**

March 9, 1994

Art Champ, Chief, Regulatory Section
Department of the Army
U.S. Army Engineer District, Sacramento
Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

Subject: Informal Section 7 Consultation on the South Delta Temporary Barriers, Middle River Near Victoria Canal and Old River Near Tracy, Public Notice 199200860, (Reference Number 1-1-94-F-4).

Dear Mr. Champ:

This responds to your letter dated October 19, 1993, requesting formal consultation under section 7 of the Endangered Species Act of 1973, as amended (Act), on the effects of two actions on the federally threatened delta smelt (*Hypomesus transpacificus*). The first action, consists of installing temporary barriers in Old River near Tracy and Middle River near Victoria Canal on or about April 20 of 1994 and 1995, and breached prior to October 1 of each year. The second action consists of installing a temporary barrier at Old River near San Joaquin River on or about April 20, with breaching to occur on May 15 of each year.

The first action, the proposed installation of two temporary barriers in Old River near Tracy and Middle River near Victoria Canal, is being concluded informally pursuant to 50 CFR 402.13. Adult delta smelt migrate upstream from the Suisun Bay into the Sacramento and San Joaquin River channels to spawn in January and continue through June depending on the timing and amount of fresh water river outflow, therefore, interference with the upstream migration of adults would be avoided if the migration begins prior to April 1. Larvae and juvenile fish are flushed downstream to rearing habitat from February through August, depending on the actual spawning time of the adult fish. The location of these two barriers would not interfere with the juveniles and larvae from being flushed to downstream habitat in the eastern Suisun Bay. We have reviewed the material transmitted with your correspondence and information found in our files and believe this action is not likely to adversely affect delta smelt, provided all mitigation measures identified in previous documentation on this project are followed and monitoring indicates that delta smelt are not present (an average of one or more adult delta smelt over the following mid-water trawl stations: 906, 913, 914, and 915) in Old or Middle Rivers from January 1 through April 1.

next / MD / Matt's letters / Barriers . F4

The second action, the proposed installation of a temporary barrier in Old River near San Joaquin River, has been assigned a separate reference number, 1-1-94-F-5, because additional discussions on the potential effects to delta smelt are needed before conclusion of consultation can be made on this proposed action. We have initiated the consultation process for the installation of the temporary barrier in Old River near the San Joaquin River and feel confident that our concerns will be resolved prior to conclusion of the consultation period.

Therefore, unless new information reveals effects of the proposed action that may affect listed species in a manner or to an extent not considered, or a new species or critical habitat is designated that may be affected by the proposed action, no further action pursuant to the Act is necessary for the installation of the temporary barriers at Old River near Tracy and Middle River near Victoria.

Please contact Matthew D. Vandenberg of my staff at (916) 978-5408 ext. 406 if you have questions regarding this response.

Sincerely,

Dale Pierce
Acting Field Supervisor

cc: NMFS, Santa Rosa, CA
CDFG, Stockton, CA
USFWS, Sacramento, CA (Attn. Wetlands Br.)

	init.	Date
Author	mw	7/8/93
SSS	SSS	7.9.93
SSS		
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AFS-HC	SS	7.12.93
AFS-WR		
ADMIN		

Ecological Services
 Sacramento Field Office
 2800 Cottage Way, Room E-1803
 Sacramento, California 95825-1846

1-1-93-J-1078

In Reply Refer To:
1-1-93-I-1078

July 8, 1993

Colonel Laurence R. Sadoff, District Engineer
 Corps of Engineers, Sacramento District
 ATTN: Regulatory Branch (Phyllis Petras)
 1325 J Street
 Sacramento, California 95814-2922

Subject: Revision to the 404 Permit for the Installation of the
 Department of Water Resources' Head of Old River Barrier
 (Public Notice #9706).

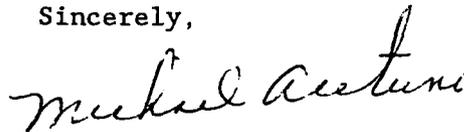
Dear Sir:

This responds to a facsimile, dated June 22, 1993, from Frank Wernette, Senior Biologist, Bay-Delta and Special Water Projects Division, California Department of Fish and Game, concerning the barrier at the head of Old River. In this facsimile, Mr. Wernette states that if low flows in the San Joaquin River persist, the San Joaquin fall-run adult fish can benefit from the barrier being left in through the first week of December. Mr. Wernette further suggests that an amendment to the Corps of Engineer permit be made to allow the barrier to remain in operation through the first week of December.

The U.S. Fish and Wildlife concurs with Mr. Wernette and believes that the proposed action is not likely to adversely affect the federally listed threatened delta smelt (Hypomesus transpacificus). Therefore, unless new information reveals effects of the proposed action that may affect species in a manner or to an extent not considered, or a new species or critical habitat is designated that may be affected by the proposed action, no further action pursuant to the Endangered Species Act of 1973, as amended, is necessary.

Please contact Matthew D. Vandenberg of my staff at (916) 978-4866, if you have questions regarding this response.

Sincerely,



Wayne S. White
 Field Supervisor